

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listing of claims in the application.

1. (Original): A color image processing apparatus comprising:
  - patch image output means for outputting patch image data generated from patch data stored in storage areas;
  - patch data extracting means for receiving read data obtained by reading, by means of a scanner, a patch image which is formed corresponding to the patch image data output from the patch image data output means, and extracting a read patch data from the read data;
  - gradation estimating means for estimating a record gradation of the patch data on the basis of the read patch data extracted by the patch data extracting means; and
  - correction output means for correcting an input color image signal on the basis of the record gradation estimated by the gradation estimating means and the patch data stored in the storage area, and for outputting the corrected signal.
2. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means and correction output means include:
  - pulse width selection table setting means for estimating the record gradation of the patch data on the basis of the read patch data extracted by the patch data extracting means and for setting a pulse width selection table on the basis of the estimated record gradation and the patch data stored in the storage area; and
  - pulse width output means for selecting a pulse width based on the pulse width selection table set by the pulse width selection table setting means, and for outputting an input color image signal in accordance with the selected pulse width.

3. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means and correction output means include:

gradation correction table setting means for estimating the record gradation of the read patch data on the basis of the read patch data extracted by the patch data extracting means, and for setting a gradation correction table on the basis of the estimated record gradation and the patch data stored in the storage area; and

gradation correction output means for correcting the gradation of an input color image signal on the basis of the gradation correction table set by the gradation correction table setting means, and for outputting the corrected color image signal.

4. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means and correction output means include:

pulse width selection table setting means for estimating the record gradation of the read patch data on the basis of the read patch data extracted by the patch data extracting means and for setting a pulse width selection table on the basis of the estimated record gradation and the patch data stored in the storage area;

second patch image output means for outputting second patch image data, by using the pulse width selection table set by the pulse width selection table setting means, corresponding to the second patch data for creating a gradation correction table which is stored in a second storage area;

second patch data extracting means for receiving second read data obtained by reading, by means of a scanner, a second patch image which is formed corresponding to the second patch image data output from the second patch image output means, and for extracting second read patch data from the second patch image;

second gradation estimating means for estimating gradation of the second read patch data on the basis of the second read patch data extracted by the second patch data extracting means;

gradation correction table setting means for setting a gradation correction table on the basis of the record gradation of the second read patch data estimated by the second gradation estimating means and the second patch data; and

correction output means for correcting an input color image signal on the basis of the pulse width selection table set by the pulse width selection table setting means and the gradation correction table set by the gradation correction table setting means, and for outputting the corrected signal.

5. (original): A color image processing apparatus according to claim 2, wherein the pulse width selection table setting means includes

pulse width selection table setting means for pre-processing the read patch data extracted by the patch data extracting means after changing ordinary input  $\gamma$  characteristic settings to linear settings, for estimating the record gradation of the patch data from the preprocessed read patch data, and for setting a pulse width selection table on the basis of the estimated record gradation and the patch data stored in the storage area.

6. (original): A color image processing apparatus according to claim 3, wherein the gradation correction table setting means includes pulse width selection setting means for pre-processing the read patch data extracted by the patch data extracting means after changing ordinary input  $\gamma$  characteristic settings to linear settings, for estimating the record gradation of the read patch data from the preprocessed read patch data, and for setting a gradation correction table on the basis of the estimated record gradation and the patch data stored in the storage area.

7. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means includes

gradation estimating means for finding C, M, Y, and K record area rates on the basis of the given read patch data and for estimating the record gradation of the patch data on the basis of the found C, M, Y and K record area rates.

8. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means includes

gradation estimating means for finding C, M, Y, and K record densities on the basis of the given read patch data and for estimating the record gradation of the patch data on the basis of the found C, M, Y and K record densities.

9. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means includes gradation estimating means for estimating the record gradation of the patch data by receiving the estimated density from a density estimator estimating the density and the area rate from an area rate estimator estimating the area rate, based on the given read patch data, and for outputting one of the estimated density and the area rate.

10. (Original): A color image processing apparatus according to claim 1, wherein the gradation estimating means includes means for estimating record gradation by receiving a plurality of pieces of estimated gradation information from a plurality of gradation estimators estimating record gradation on the basis of the given read patch data, using reference tables, and by selecting and outputting one of the pieces of estimated gradation information.

11. (original): A color image processing apparatus comprising:  
first patch image output means for outputting first patch image data on the basis of the first patch data for creating a pulse width selection table stored in the first storage area;  
first patch data extracting means for reading, using a scanner, a first patch image which is formed corresponding to first patch image data output from the first patch image output means, and for extracting first patch data in accordance with the first patch image;  
first gradation estimating means for estimating record gradation of the first read patch data, from the first read patch data extracted by the first patch data extracting means;  
pulse width selection table setting means for setting a pulse width selection table on the basis of the record gradation of the first read patch data estimated by the first gradation estimating means and the first patch data;  
second patch image output means for outputting second patch image data, using the pulse width selection table set by the pulse width selection table setting means, corresponding to the second patch data for creating a gradation correction table stored in the second storage area;  
second patch data extracting means for reading, using a scanner, a second patch image which is formed corresponding to the second patch image data output from the second patch image output means, and for extracting second read patch data in accordance with the second patch image;

second gradation estimating means for estimating the record gradation of the second read patch data on the basis of the second read patch data extracted by the second patch data extracting means;

gradation correction table setting means for setting a gradation correction table on the basis of the record gradation of the second read patch data estimated by the second gradation estimating means and the second patch data;

third patch image output means for outputting third patch image data, using the pulse width selection table set by the pulse width selection table setting means and the gradation correction table set by the gradation correction table setting means and on the basis of the third patch data for creating a color conversion table stored in a third storage area;

third patch data extracting means for reading, using a scanner, a third patch image represented by third patch image data output by the third patch image output means, and for extracting third patch data according to the third read patch image;

color conversion table setting means for setting a color conversion table on the basis of the third read patch data extracted by the third patch data extracting means and the third patch data; and

correction output means for correcting a given and input color image signal on the basis of the pulse width selection table set by the pulse width selection setting means, the gradation correction table set by the gradation correction table setting means, and the color conversion table set by the color conversion table setting means, and for outputting the corrected signal.

12. (original): A color image processing apparatus according to claim 11, wherein the pulse width selection table setting means include

pulse width selection setting means for pre-processing the read patch data extracted by the patch data extracting means after changing ordinary input  $\gamma$  characteristic settings to linear settings, for estimating the record gradation of the read patch data from the preprocessed read patch data, and for setting a gradation correction table on the basis of the estimated record gradation and the patch data stored in the storage area; and

wherein the gradation correction table setting means include gradation correction table setting means for pre-processing the read patch data extracted by the patch data extracting means after changing ordinary input  $\gamma$  characteristic settings to linear settings, for estimating the record gradation of the read patch data from the preprocessed read patch data, and for setting a gradation correction table on the basis of the estimated record gradation and the patch data stored in the storage area.

13. (original): A color image processing apparatus according to claim 11, wherein the gradation estimating means includes

gradation estimating means for finding C, M, Y, and K record area rates on the basis of the given read patch data and for estimating the record gradation of the patch data from the area rates.

14. (original): A color image processing apparatus according to claim 11, wherein the gradation estimating means includes

gradation estimating means for finding C, M, Y, and K record densities on the basis of the given read patch data and for estimating the record gradation of the patch data from the densities.

15. (original): A color image processing apparatus according to claim 11, wherein at least one of the first and second gradation estimating means includes

gradation estimating means for estimating the record gradation of the patch data by receiving the estimated density from a density estimator estimating the density and on the basis of the given read patch data and the area rate supplied from an area rate estimator estimating the area rate, and for outputting one of the estimated density and the area rate.

16. (original): A color image processing apparatus according to claim 11, wherein at least one of the first and second gradation estimating means includes

means for estimating record gradation by receiving a plurality of pieces of estimated gradation information from a plurality of gradation estimators estimating record gradation from the given read patch data and selecting and outputting one of the pieces, by using reference tables.

17. (canceled):

18. (Currently Amended): A color image forming apparatus comprising:

a color scanner for reading a color image from a given original and for outputting color image data;

a color printer for forming an image on a recording medium in accordance with the color image data;

first patch image forming means for forming, using the color printer, first patch image on a recording medium in accordance with the first patch data for creating a pulse width selection table, which is stored in first storage area;

first patch data extracting means for extracting first read patch data from the read image data obtained by reading, using the color scanner, the first patch image formed by the first patch image forming means;

first gradation estimating means for estimating record gradation of the first read patch data on the basis of the first read patch data extracted by the first patch data extracting means;

pulse width selection table setting means for setting a pulse width selection table on the basis of the record gradation of the first patch data estimated by the first gradation estimating means;

second patch image forming means for forming a second patch image on a recording medium using the color printer and the pulse width selection table set by the pulse width selection table setting means on the basis of the second patch data for creating a gradation correction table stored in the second storage area;

second patch data extracting means for extracting second read patch data from read image data obtained by reading, using the color scanner, the second patch image output by the second patch image forming means;

second gradation estimating means for estimating record gradation of the second read patch data on the basis of the second read patch data estimated by the second patch data extracting means;

gradation correction table setting means for setting a gradation correction table on the basis of the record gradation of the second read patch data estimated by the second gradation estimating means and the second patch data;

third patch image output means for forming a third patch image on a recording medium with the color printer, using the pulse width selection table set by the pulse width selection table setting means and the gradation correction table set by the gradation correction table setting means on the basis of third patch data for creating a color conversion table stored in the third storage area;

third patch data extracting means for extracting third read patch data from read image data obtained by reading a third patch image formed by the third patch image forming means, using the color scanner;

color conversion table setting means for setting a color conversion table ~~on the basis~~ the basis of the third read patch data extracted by the third patch data extracting means and the third patch data;

correction output means for correcting an input color image signal on the basis of the pulse width selection table set by the pulse width selection setting means, the gradation correction table set by the gradation correction table setting means, and the color conversion table set by the color conversion table setting means and output the corrected signal; and

forming means for forming, using the color printer, an image on a recording medium in accordance with the color image signal corrected and output by the correction output means.